

The snow fell gently, without wind, from about 8:30 p. m. of the 10th to during night a. m. of the 12th, but the major portion of the snow had fallen by 8 a. m. of the 11th, and even the smallest twigs held a goodly share. Spaces as wide as 10 inches were bridged across and bunches of snow remained in the trees for three days. The weight of the snow, however, was small and little damage was done. No limbs of trees were broken, but a few electric wires came down. Country roads were not blocked to automobiles.

During the fall of snow the temperature remained steadily at 32° F.

The quite unusual clinging quality of the snow was due to the fact that the crystals were straight, fuzzy rods averaging about one-sixteenth inch in length and these, on reaching a suitable support, clung together, forming a tenacious blanket.—*John R. Weeks.*

#### SNOW ROLLERS.

AVON, N. Y., *February 9.*—When Peter Finigin went out to do the chores one morning recently he was mystified by the sight of a large number of huge snowballs scattered over his farm. On the 20-acre field there were hundreds of them, ranging in size from 6 to 18 inches in diameter. Leading up to each snowball was a streak of bare ground showing the distance it had traveled in forming.

Mr. Finigin and neighbors who gathered to study the odd spectacle decided that the wind, which had blown a gale the night before, had whipped up small particles of "good packing" snow and started them down the field, some of the particles gathering up additional snow until balls had been formed that were too heavy for the wind to

move farther. All the paths of the snowballs were in the same general direction that the wind had been blowing.

To record the unusual freak of wind and snow, Mr. Finigin sent for the correspondent of a Buffalo newspaper, who counted more than 1,000 snowballs of more than 10 inches in diameter.—*Washington Evening Star*, Feb. 9, 1921.

#### BIBLIOGRAPHIC NOTE.<sup>1</sup>

\* \* \* The most extensive account of snow rollers in the English language is that given in the *Quarterly Journal* of the Royal Meteorological Society, volume 34, 1908, pages 87-96. This is mainly a compilation of accounts of the phenomenon previously published in scientific books and journals, and is illustrated. Some of these accounts appeared in the MONTHLY WEATHER REVIEW.<sup>2</sup>

Probably the most important contribution to the subject of snow rollers is the article, "Schneewalzen," by Rudolf Meyer, in *Korrespondenzblatt des Naturforschervereins zu Riga*, volume 52, 1909. This gives a list and analysis of all cases known to the writer between the years 1808 and 1909, and is accompanied by a bibliography which lists 35 previous papers on the subject in several languages.

Snow rollers were observed in Morris County, N. J., in January, 1809, by Rev. D. A. Clark, when it is stated that "the whole landscape was covered with snowballs, differing in size from that of a lady's muff to the diameter of 2½ or 3 feet, hollow at each end to almost the very center, and all as true as so many logs shaped in a lathe."—*C. Fitzhugh Talman.*

<sup>1</sup> Reprinted from *Scientific American*, New York, Mar. 15, 1913, p. 243.  
<sup>2</sup> Dec., 1895, 23:465; Jan., 1898, 26:20; Mar., 1899, 27:100; July, 1906, 34:325-326; Feb., 1907, 35:70.

#### OUR INVOLUNTARY CLIMATIC TRAVELS.

(WITH SPECIAL REFERENCE TO THE WARM WINTER OF 1920-21.)

By JOSEPH BURTON KINCER, Meteorologist.

[Weather Bureau, Washington, D. C., Mar. 2, 1921.]

551.58 (73)

The temperature of the atmosphere to which we are subjected, from day to day, plays an important rôle in our everyday life, particularly in so far as our bodily comfort when we are out of doors is concerned. Most of us do not relish extreme temperature conditions, and a considerable portion of our energy is expended in an effort to keep cool in hot, summer weather, and to keep warm when it is cold.

To escape the extreme temperature conditions of winter and summer, many people migrate yearly from north to south in winter and from south to north in summer. In northern latitudes they turn southward as the rigors of winter set in to sojourn until the gentle zephyrs of spring are due in their home community. Again, when the heat of summer begins in central and southern climes, all roads lead to some cool summer resort.

While some people thus bodily change their place of residence to enjoy climatic environments different from those usually experienced at home, many others, and much the greater portion of our population, either for reasons of choice, or for those beyond their control, stay at home. These latter, however, practically never stay at home climatically. They travel regardless of the press of business or the condition of their purse, but are not affected by increased railway or Pullman fares, for the figurative weather train furnishes free passage.

We are often handicapped, however, by reason of the fact that the science of meteorology has not, as yet, reached that degree of excellence where it is possible to forecast, with approximate certainty, in which direction, north or south, we will be transported to spend the season. To this end, however, the Weather Bureau is engaged in scientific investigations, to ascertain if seasonal schedules can be made. If this can be done our plans can be made accordingly, often at great economic advantage.

While we can not yet tell definitely in advance where our climatic season abode shall be, after we have enjoyed or deplored our involuntary weather trip, and have spent the winter or the summer either north or south of home, climatically, we can then consult the Weather Bureau records and determine just where we have been.

Such expressions as "It wasn't necessary to go to Florida this winter to enjoy a pleasant climate, for the weather here has been delightful" have been frequently heard recently. These suggest the questions, "How far south, from the standpoint of climate, did we really spend the winter just closed?" "Did we go as far south this winter as in some previous years?" "What is the farthest point south we have ever climatically spent a winter?" The answers to these and similar questions with regard to the summer season may be of interest, especially to those who have never given much thought to the fact that a

change in temperature conditions is equivalent, climatically, to an actual journey, either north or south, depending upon whether the prevailing weather at the point under consideration is colder or warmer than the average for that particular place. If we consider the questions from the standpoint of the average temperature of individual months, our weather travels are usually somewhat more extensive than when we consider a season, such as a winter or a summer, as a whole; the monthly variations, in turn, depend upon our daily excursions, being the resultant, or average of the latter.

The average or climatic temperature in the United States increases from north to south. East of the Rocky Mountains, where topographic influence is small, this increase is quite uniform. In the winter season it is pronounced, but is less rapid in summer. For winter the normal temperature varies from slightly above zero along the north-central border of the country (in northeastern North Dakota and northwestern Minnesota) to about 53° along the Gulf coast. In summer the increase is much less rapid. In general, an increase of 1° in the normal temperature in winter from north to south corresponds to a distance of about 27 miles. In descending the Mississippi Valley in summer 1° increase in normal temperature covers about 68 miles in the northern portion of the valley and about 100 miles in the central, while from Memphis southward the ratio is more than 500 miles for 1° of temperature. In the Atlantic Coast States the increase for 1° is about 55 miles in the northern, 85 in the central, and 150 miles in the southern portion. With these data available and with a knowledge of the normal temperature for a given place and the actual condition for a given time we can readily determine just how far north or south we climatically spent any summer or winter, individual month, or even a day.

The winter just closed (December, 1920–February, 1921) was characterized by a remarkable and persistent mildness in all sections of the country east of the Rocky Mountains. It therefore happened that not only those who make it a practice to go South for the winter carried out their usual program, but the Nation-wide weather train, which operates from every locality in the United States, carried the entire population southward, not all of us to Florida, of course, but nevertheless to a considerable distance in that direction.

Figure 1 shows just how extensive our travels have been in the different sections of this area. Heavy lines have been drawn along latitudes 32.5°, 37.5°, 42.5°, and 47.5°, representing the four major 5° belts of latitude across the eastern United States. The arrows to the southward of each line show the average extent of the southward climatic journey for the localities within each 5° belt of latitude represented. For example, people in central North Dakota, climatically speaking, spent the winter near the South Dakota-Nebraska boundary line; those at Sioux City, Iowa, at Kansas City, Mo.; Chicago, in southern Indiana; southern Indiana in northern Tennessee, and Washington, D. C., in southern Virginia. The broken line to the north of each heavy line indicates in like manner the relative climatic shift for the previous winter, 1919–20, mostly in the opposite direction. That winter was considerably colder than usual in all central and northern districts from the Mississippi Valley eastward, and consequently persons living in this territory were not so fortunate as in the winter just closed. For example, for the winter of 1919–20, Richmond came north, climatically, to Washington to spend that winter and went south to Raleigh, N. C., for the one just closed.

While the winter of 1920–21 will be classed as one of the mildest on record east of the Rocky Mountains, it was not a "record breaker," and several others in the last 50 years compared favorably with it. In the central and northern sections of the country east of the Rocky Mountains the winter of 1877–78 still holds the 50-year record for mildness, although it came dangerously near surrendering that distinction this time. St. Paul, Minn., spent the winter of that year at Hannibal, Mo.; Bismarck, N. Dak., at Omaha, Nebr.; and Chicago at Cairo, Ill. From the Ohio Valley and Middle Atlantic States southward the winter of 1889–90 holds the record for mildness. In that year the figurative weather train took the people of Cincinnati down to Memphis, Tenn., and Washingtonians south to northeastern South Carolina. The farthest north Washingtonians have spent a winter climatically was in southern Connecticut, in both 1903–4 and in 1904–5.

It has been previously stated that our climatic sojourns, when considered on a monthly basis are frequently some-



FIG. 1.—Climatic geographic displacements (north and south) of winters of 1919–20 (dashed) and 1920–21 (solid) from the normal.

what more extensive than for a season as a whole. In this connection it may be of interest to point out a few of the most pronounced cases of record. For that purpose Washington, D. C., and St. Louis, Mo., will be used as a basis, considering only January and July, or the mid-winter and midsummer months. The farthest south St. Louis has spent January was at Greenwood, Miss., in 1880; and the farthest north was near Dubuque, Iowa, in 1918. Washingtonians sojourned in northeastern South Carolina in January, 1890, and in extreme southwestern Maine in 1918. The extremes for St. Louis in July were southeastern Minnesota, in 1891, and beyond the Gulf coast in 1909. Northeastern South Carolina appears to be the southern limit for Washington for monthly visits as well as for seasonal. We visited there during July, 1872, while for July, 1891, we went north to a real summer resort, Lake George, N. Y.

These relative monthly and seasonal thermal shifts alternating from north to south, are the resultant or average, of our daily climatic excursions. The basic, funda-

mental temperature data are the daily values, and when these are considered in their relation to the seasonal normal, they furnish an even more striking and interesting picture of our migrations between warmer and colder latitudes. Some one has described the average, or normal, meteorological condition as "that which never occurs"; certainly it seldom occurs.

Unlike the poet, the meteorologist has no special license to indulge in figurative speech, but with the indulgence of the reader, we shall at this point digress somewhat from the orthodox phraseology usually employed in scientific explanations of natural phenomena, and give a brief paraphrased description of our daily climatic travels during a short midwinter period of the present year.

Let us draw a mental picture of all Washington, D. C., as being aboard a weather train that transports us alternately between northern and southern latitudes as the temperature from day to day varies from warmer to colder or vice versa. The major travels for this train during the winter just closed may be seen most graphically in figure 2, where the important peaks and crests of the mean daily temperature curve are marked with the names of the places where such temperatures are normal

enjoyed at this point twice in the last 50 years, on January 12 and 13, 1890, and on January 27, 1916.

It is obvious that the conductor of this figurative weather train has anything but a fixed schedule, and apparently without rhyme or reason, changes his plans on the spur of the moment and acts accordingly, absolutely refusing to take the public into his confidence. Now, here is where the official forecaster of the Weather Bureau comes to our assistance. Each and every community in the United States is the headquarters for a weather train that is constantly moving climatically north or south. The schedules are controlled by physical laws, and the forecaster must determine each day in the year just what the schedules for the following day or two are to be for each train operating under this vast transportation system. This determined, he announces them for the benefit of the public that they may make their plans accordingly.

The question, however, is not even so simple as here indicated, for at one time Dame Nature may decide on considerable uniformity of movement and order all trains over a large section of the country in the same general direction, either north or south; while at other times, no such uniformity exists and even in near-by

localities the train movements may be oppositely directed. In the first case, the whole system may be viewed as being operated under orders issued from a central office by a general train dispatcher, with a definite plan of coordinated movements, while in the second case the matter is apparently left to the whims and wishes of the conductor of each individual train. A large percentage of the forecaster's failures of verification occur under the latter conditions. Viewed in this light, his job is by no means an enviable one, and we must agree that a verification record averaging 85 to 90 per cent perfect, the record he is making to-day, is creditable.

One week ahead is now about the limit of a reliable schedule. Imagine, if you can, what a schedule weeks in advance would mean to us stationary weather travelers.

551.524 : 633

#### OPEN WINTER AND PLANT LIFE.

[Reprinted from the *Philadelphia Public Ledger*, Jan. 5, 1921.]

An open winter, such as is being experienced in this locality this year, is generally more injurious to plant life than it is beneficial, in the opinion of Dr. John W. Harshberger, professor of botany at the University of Pennsylvania.

Certain plants, according to Dr. Harshberger, have been so protected and planned by nature that they are unaffected by such unusual weather, and in other cases no definite harm is done unless the warm period lasts a long time.

Warm weather in winter is not especially injurious to plant life unless it starts dormant buds to swell and burst open, thus exposing the delicate leaf and flower tissues to the action of the succeeding cold spell.

There are many native plants, trees, and shrubs which are not ordinarily stimulated to development by warmth

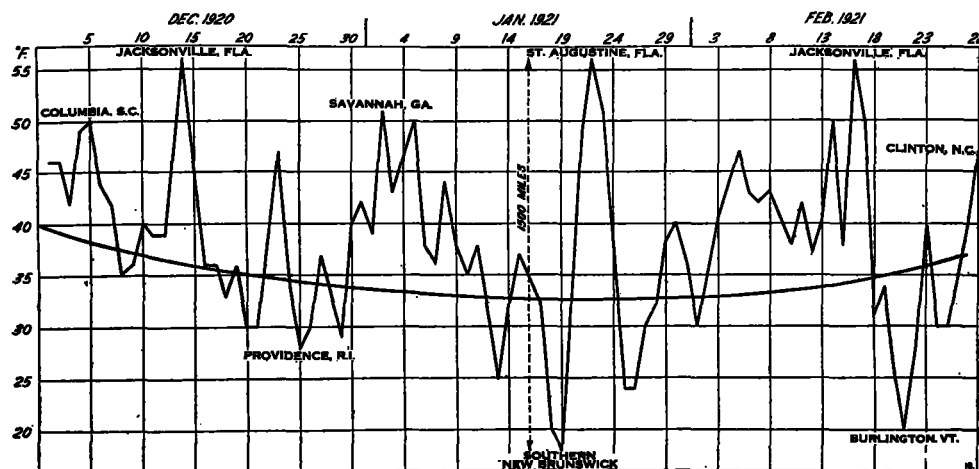


FIG. 2.—Mean daily temperatures at Washington, D. C., Dec. 1, 1920, to Feb. 28, 1921.

for the season. To emphasize the erratic nature and extent of these travels, a 10-day period in midwinter of the current year will be followed in detail; the train will be considered "at home" when the temperature for the day at Washington is normal for the season. Starting from home on January 17, 1921, our train headed for the North and did not stop until Eastport, Me., was reached on the 18th. The following day a short reconnoitering trip farther up the coast in New Brunswick was made. We then turned southward, reaching Washington on the 20th. Only a one-day stopover was made at home, however, and our journey was resumed toward the South.

The 21st was spent at Wilmington, N. C., while St. Augustine, Fla., was scheduled for the following day. Remaining in this well-known winter resort only one day, the return northward was begun; Savannah, Ga., was passed on the 23d and Richmond, Va., on the 24th. At this point more steam was applied and the following day we appeared in southwestern Maine. After remaining there two days, another southward journey was begun, passing through Washington on the 28th.

Fort Pierce, Fla., about 75 miles north of Palm Beach, is the farthest south Washingtonians have ever spent a day climatically in January. An outing has been